MULTIMEDIA UNIVERSITY

STUDENT ID NO

VENUE : _____

SEAT NO : _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

TCS 3311–COMPILER DESIGN

(All sections / Groups)

25 OCTOBER 2019
9.00 am – 11.00 am
(2 Hours)

Question	Marks
1	
2	
3	
4	
Total	

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 10 pages with 4 Questions only.
2. Attempt All Questions. The distribution of the marks for each question is given.
3. Write all your answers in this Question paper.

Question 1

(a) Give a programming language example that is translated using a compiler. Explain why the given programming language is a compiler based translator. [2]

(b) Give a programming language example that is translated using an interpreter. Explain why the given programming language is an interpreter based translator. [2]

(c) Give a programming language example that is translated using a hybrid compiler. Explain why the given programming language is a hybrid based translator. [3]

Continued .....

(d) Give one advantage of a compiler over an interpreter. [2]

(e) Give one advantage of an interpreter over a compiler. [2]

(f) Indicate yes or no of the following terms when applied to the Java programming language. [1.5]
i. scripting
ii. declarative
iii. fourth generation

i.
ii.
iii.

Continued .....

Question 2

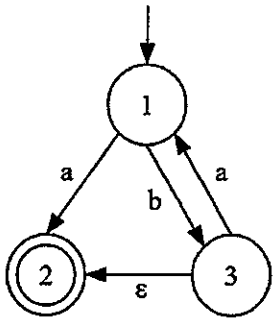
(a) Consider the following grammar. [3.5]

$E \rightarrow T\ X$
$T \rightarrow (\ E\ ) \mid \text{int}\ Y$
$X \rightarrow +\ E \mid \varepsilon$
$Y \rightarrow *\ T \mid \varepsilon$

i. Find the set for the FIRST(E).
ii. Find the set for the FIRST(X).
iii. Find the set for the FOLLOW(E).
iv. Find the set for the FOLLOW(X).

i.
ii.
iii.
iv.

(b) Consider the following NFA. [9]



i. Explain what ε-closure of a state is using an example from the above NFA.

Continued .....

ii. Convert the NFA to a DFA using subset construction. Provide all the steps, the transition table, and the DFA.

Continued .....

Question 3

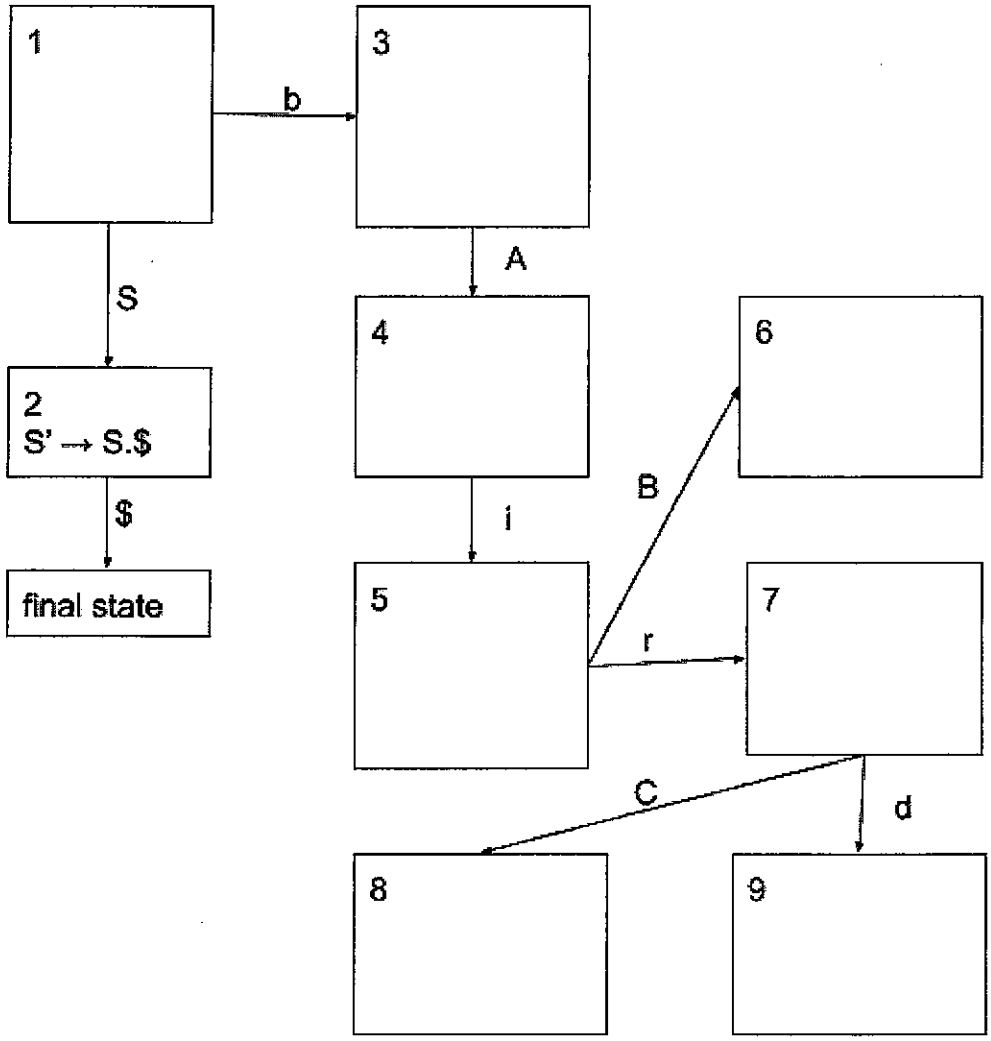
Consider the following grammar.

S → b A i B
A → ε
B → r C
C → d

where b, d, i, and r are terminals.

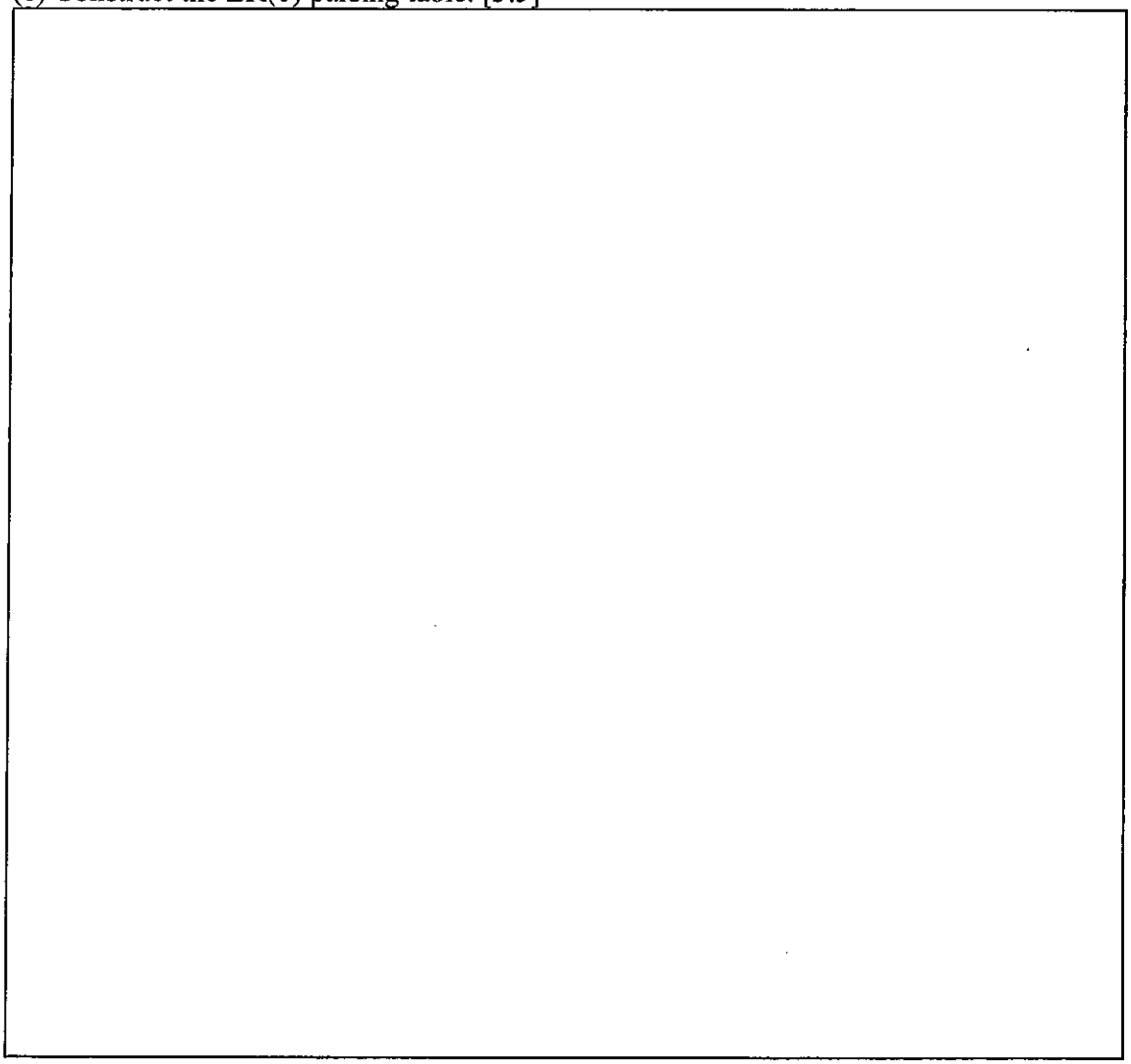
(a) Augment the start symbol. [1]

(b) Complete the following DFA of LR(0) to illustrate transitions between states for the augmented grammar by giving all the states of items. [8]



Continued .....

(c) Construct the LR(0) parsing table. [3.5]



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Question 4

(a) Consider the following code segment. [2]

```
var = 3108;
double var;
```

Does the above code segment have scope error? Explain your answer.

(b) Optimize each of the following code segment and then explain your answer. [5.5]

i.

```
ST x y
ST y x
```

ii.

```
LD R2, R1
GOTO L1
L1: GOTO L2
L2: INC R1
```

Continued .....

(c) Convert the expression (-(a-b)+c) into each of the following. [5]
i. syntax tree
ii. three-address code
iii. quadruples
iv. triples
v. indirect triples

i.
ii.
iii.

Continued .....

iv.
v.

End of Page